

Triple Isotope Water Analyzer for Extraplanetary Studies, Phase I

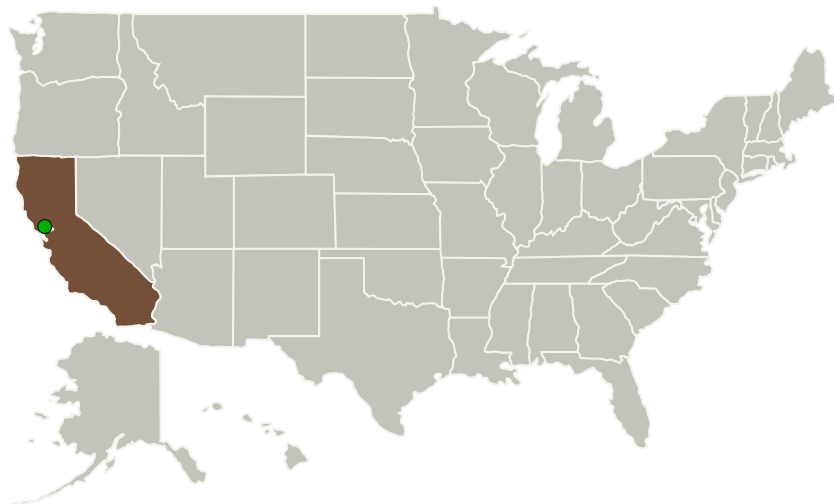
Completed Technology Project (2012 - 2012)



Project Introduction

In this Small Business Innovative Research (SBIR) effort, Los Gatos Research (LGR) proposes to develop a miniature, high-resolution, low power, triple-isotope water analyzer for lunar and planetary exploration based on tunable diode laser absorption spectroscopy (TDLAS) in conjunction with LGR's patented Off-Axis Integrated Cavity Output Spectroscopy (Off-Axis ICOS) technique. This compact instrument will provide highly accurate quantification of H_2^{16}O , HOD , H_2^{18}O , and H_2^{17}O (δD , $\delta^{18}\text{O}$, and $\delta^{17}\text{O}$ to better than ± 0.3 and ‰ , ± 0.1 and ‰ , and ± 0.15 and ‰ respectively) with minimal calibration or consumable standards. In order to achieve this sensitivity and accuracy, Off-Axis ICOS employs a high-finesse cavity that increases the measurement path length to several kilometers, making it much more sensitive than conventional TDLAS methods which typically have path lengths ranging between several centimeters to several meters. Moreover, due to the inherent benefits of the Off-Axis ICOS technique, the analyzer will be selective, robust, and economical superseding other high-finesse cavity techniques (e.g., cavity ring-down spectroscopy). In addition to being a strong candidate for extraplanetary exploration, the resulting instrument will be deployed for field testing and research by scientists in NASA's Space Science and Astrobiology Division.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Los Gatos Research	Lead Organization	Industry	Mountain View, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California

Project Transitions

**February 2012:** Project Start**August 2012:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138353>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Los Gatos Research

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Manish Gupta

Co-Investigator:

Manish Gupta

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Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.2 Atomic and Molecular Species Assessment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System